

On a New Subspecies of the Purple Emperor, *Apatura iris* (Lepidoptera: Nymphalidae), from the Republic of Korea

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Introduction

The Purple Emperor is one of the Palaearctic species widely distributed across the temperate zone of the Eurasian Continent. While it is found in England, it does not occur in Japan, just as in the case of the magpie* (bird). The absence of the Purple Emperor in the Japanese Archipelago can be ascribed to climatic rather than geographical factors, and the authors believe it is not impossible to consider that this butterfly inhabited, during the glacial period what was to become the present Japan, but became extinct as a result of certain unfavourable changes in climate that brought more rain and warmer winter to the Japanese islands.

In Korea, Japanese entomologists in prewar days mainly looked for this species in hilly or mountainous regions in northern districts, more specifically in the Hamgyeong Provinces. The North Korean specimens were mostly believed to belong to subsp. *amurensis* STICHEL.

However, *amurensis* as a subspecies of *iris* appears to have been defined rather vaguely. STICHEL (1905) described this in "SEITZ I" as follows: "In Amurland the brownish colour of the bands and spots is the rule in the ♀ (cf. *lutescens*); the ♂ is of especially large size, the ground colour of the wings being less dark and the gloss stronger and of a lighter reddish blue. We have here do [*sic*] with a local form, for which it appears expedient to introduce the name *amurensis*, subsp. nova."

LE MOULT (1950) then observed: "One may complement STICHEL's description as follows: the size is in fact evidently larger than that of the typical subspecies; the gloss of the ♂ is quite different; however, "reddish violet" seems to be more exact to denote the hue of the gloss; finally the light spots in the ♂ are smaller than in the other Eastern races. The only ♀ of this subspecies that could be studied showed a strongly developed submarginal band on any of the four wings and more of an ochre colour instead of white; the other light markings being a yellowish white with the exception of the submarginal spots on the forewings which are pure white. A more complete series of this sex would perhaps make it possible to describe interesting individual forms, as STICHEL's description suggests that the female is dimorphic. Distribution: this form has

* Introduced into northern Kyûshû towards the 16th century from Korea, surviving to date in isolated colonies.

been recorded from Eastern Siberia (including Askold Island), Korea and Jaan [*sic*]. It is also found in Manchuria; the above description is based on a series of ♂♂ of Harbin; the ♀ studied came from Handashedsi: these two localities are in Manchuria.”**

Let it be stated here that the locality of this female should be referred to as Hengdaohezi (=Hêngtaohotzu) on two grounds: it reflects a local, and possibly Russian, too, accent, and it is probable that the letter o was mistaken for an ‘s’ when handwritten data were read. Hengdaohezi is about 270 kilometres southeast of Harbin, being on the Binsui Line (formerly the Eastern Chinese Railway laid by Russia). It can be said that the mountain mass crowned by Mt. Paektu (=Mt. Changbai) is a stronghold of *amurensis*, with Hengdaohezi situated in the Zhang-guang-cai-ling Range, a long northern branch of the massif, and many of the well-known North Korean localities, on its southern side.

Following the capture of a “white-banded” female *iris* on Musanryeong, North Korea, SUGITANI (1932) first cast doubt about the features on which *amurensis* was based. He was not aware that the females of the northern race might be polymorphic, but concluded that the female should deserve an identity as *iris iris* by reason of its white spots and bands. Later, SEOK (1942) subscribed to this view, but was sensible enough to degrade both *amurensis* and SUGITANI’s second *iris* from the subspecific rank to ‘forms’ (indeed, no plural subspecies should occur sympatrically). His posthumous work (1973) mentions the localities of “f. *iris*” both in peripheral areas of the northern mountain mass and on central and southern mountains.

SEOK apparently collected a few females of *iris* in Central Korea, and possibly on Mt. Jiri in the south. Yet he failed to make any attempt to compare the white-banded females of northern and southern origins. Neither did he try to find distinctions between northern and southern male specimens. As far as the SUGITANI Collection is concerned, there is no specimen of *iris* of either sex from central or southern localities.

Be that as it may, SEOK drew a demarcation line between the territories of the two “forms.” The line starts near Heungnam on the Japan Sea coast and a little south of the 40th parallel, then runs westward as far as Gacheon on the Cheongcheon River, from where it goes northward towards Jaseong via Hicheon and Ganggye. There is a wide gap in distribution of *iris* on the Korean Peninsula south of the demarcation line. The northernmost locality so far known in Central Korea appears to be Mt. Gumgang, near the east coast. Further south, *iris* seems to be widespread but by no means common (see Habits later) along the Taebaeg, Sobaeg and Gwangju Mountain Ranges. The authors however reject Jeju Island as an *iris* locality, because there is only one, and dubious, too, record and there are absolutely no recent captures on the island province.

One of the present authors, LEE, has been collecting insects extensively on central and southern mountains since the end of the Korean War, and recorded this butterfly at numerous localities. The other author, TAKAKURA, had opportunities of observing *iris* in all stages during his stay in Europe in 1963 and 1972. He also succeeded in collecting male specimens in Central Korea in 1977 and 1980, a female in 1977, and in late June, 1978, he was fortunate to spot a pupa in the wild, which soon produced a fine male.

** Translated from French by TAKAKURA.

In this paper the authors describe the southern race of *iris* as a distinct subspecies on the basis of the specimens obtained by TAKAKURA, which were compared both with the examples collected by LEE and those TAKAKURA came by from British and European sources. Comparison was also made by TAKAKURA with North Korean specimens collected before 1945 (in the SUGITANI and MOTONO Collections) and those that were commercially available in Tokyo in 1979.

Apatura iris peninsularis subsp. nov.

(Figs. 2, 4; 6, 8)

♂: *Upperside* solidly very dark brown over a wide area, with white spots and bands rather reduced despite the large wings; submarginal white spots in spaces 2 and 3 of forewing small and not as clearly defined as the others, and that in space 2 very small and often suffused with orange scales, or lost altogether; row of five or six dark, triangular postdiscal spots on hindwing not very distinct because of the dark ground colour; purple sheen present over a wide area, extending well into the submarginal areas of both wings (Fig. 2); light brown submarginal belt accordingly narrow and running close to the outer margin on either wing.

Underside richly coloured, with orange brown discal zone on hindwing delineated with dark scales, particularly on the outer boundary; the orange brown discal area in space 7 on hindwing wide, and often brighter than elsewhere; lilac marginal zone on hindwing narrow despite the large wing size, becoming darker towards the brown discal zone.

♀: *Upperside* solidly dark over a wide area, with well developed white spots and discal band except for submarginal spot in space 2; row of dark, triangular postdiscal spots on hindwing indistinct as in male; pale submarginal belt very narrow for the large wing and whitish in hue, running close to the outer margin on either wing.

Underside similar to that of male but characterized on hindwing by extremely broad discal band of a bugle-shape; orange brown zone becoming brighter from space 5 to space 7; the oval space defined clockwise by the outer boundary of the white discal band, vein 8, outer margin, anal angle and vein 1b fairly distinctly divided into three zones, viz.: the orange brown discal belt, a rather wide and elliptical intermediate zone profusely covered with dark scales, and the narrow but contrastive lilac marginal belt.

Holotype: ♂, ex pupa 30th June 1978, Mt. Sobaeg, Gyeongsang Bugdo, ROK, leg. TAKAKURA. Wing expanse 68.5 mm, forewing length 39 mm.

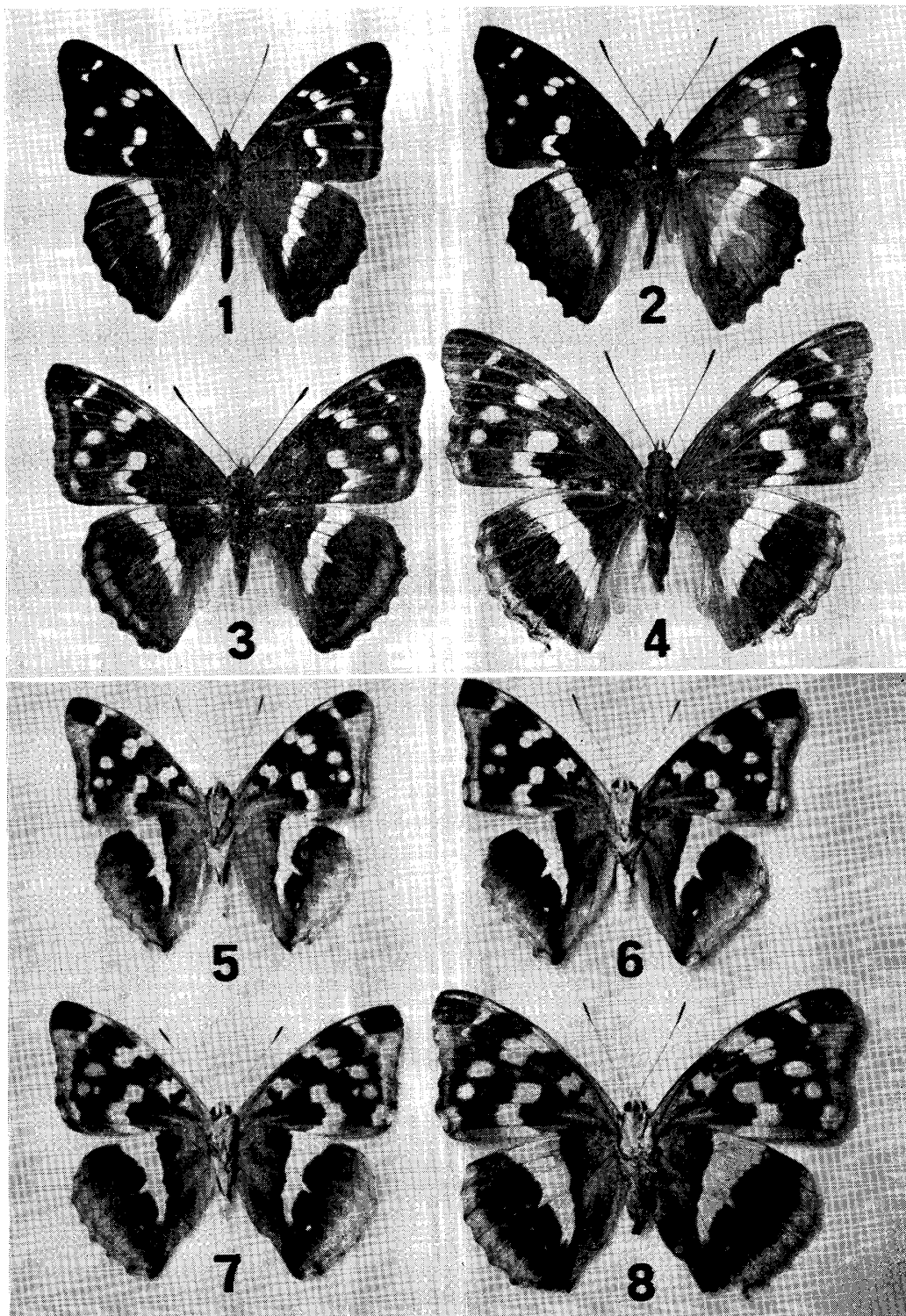
Allotype: ♀, 30th July 1977 from the same locality, leg. TAKAKURA. Wing expanse 83 mm, forewing length 46 mm.

Paratypes: 17 ♂ from the above locality (6 exx. 1st August 1977, 11 exx. 26th July 1980), leg. TAKAKURA.

All these specimens are preserved in TAKAKURA's collection.

Discussion

As mentioned in the introduction, SUGITANI believed that *iris iris* also occurred in North Korea, because 1) North Korean specimens looked very much like examples from Europe (Lièpvre, France; Darmstadt, Germany; etc.), being only slightly bigger



Figs. 1-8. 1. *A. i. amurensis* ♂, 19.7.79, Mt. Paektu. Wing expanse 63 mm, forewing length 37 mm. 2. *A. i. peninsularis* subsp. nov. ♂ (Holotype). Wing expanse 68.5 mm, forewing length 39 mm. 3. *A. i. amurensis* ♀, 18.7.79, Paegam. (Tsukada Coll.) Wing expanse 73 mm, forewing length 42 mm. 4. *A. i. peninsularis* subsp. nov. ♀ (Allotype). Wing expanse 83 mm, forewing length 46 mm. 5-8: undersides of figs. 1-4.

than the latter (ca. 3 mm in wing expanse in males: *loc. cit.*) and 2) a white-banded female was taken near Hoeryeong, where *amurensis* females had been collected. But earlier STICHEL in SEITZ mentioned: "... the brownish colour ... is the rule in the ♀" (in French: ... 1a ♀ a ordinairement les bandes ... brunâtres), which made LE MOULT think that in Asian localities *iris* females may be dimorphic. SEOK (1942) maintained the light markings of the females ranged from white to pale brown by way of yellow, and ascribed richer pigmentation to colder climates. The authors do not agree to this view because *iris* females, of Europe at least, do not appear to be very sensitive to changes in weather during the final larval instar or the pupal stage. Localities in Central and Southern Korea are upwards of 600 to 800 metres in altitude, where the climate can be equally cold and June temperatures can be low, yet no female comparable to *amurensis* is known to science yet. The sole ♀ taken on Mt. Seolag and preserved in the National Science Museum, Seoul, is white-banded and has whitish, narrow submarginal bands on the upper side, while another female taken in 1979 near the Hibang-sa Temple just below Mt. Sobaeg is exactly similar to the allotype, though only slightly smaller (leg. Y.-S. Kim: wing expanse 82 mm, forewing length 45 mm).

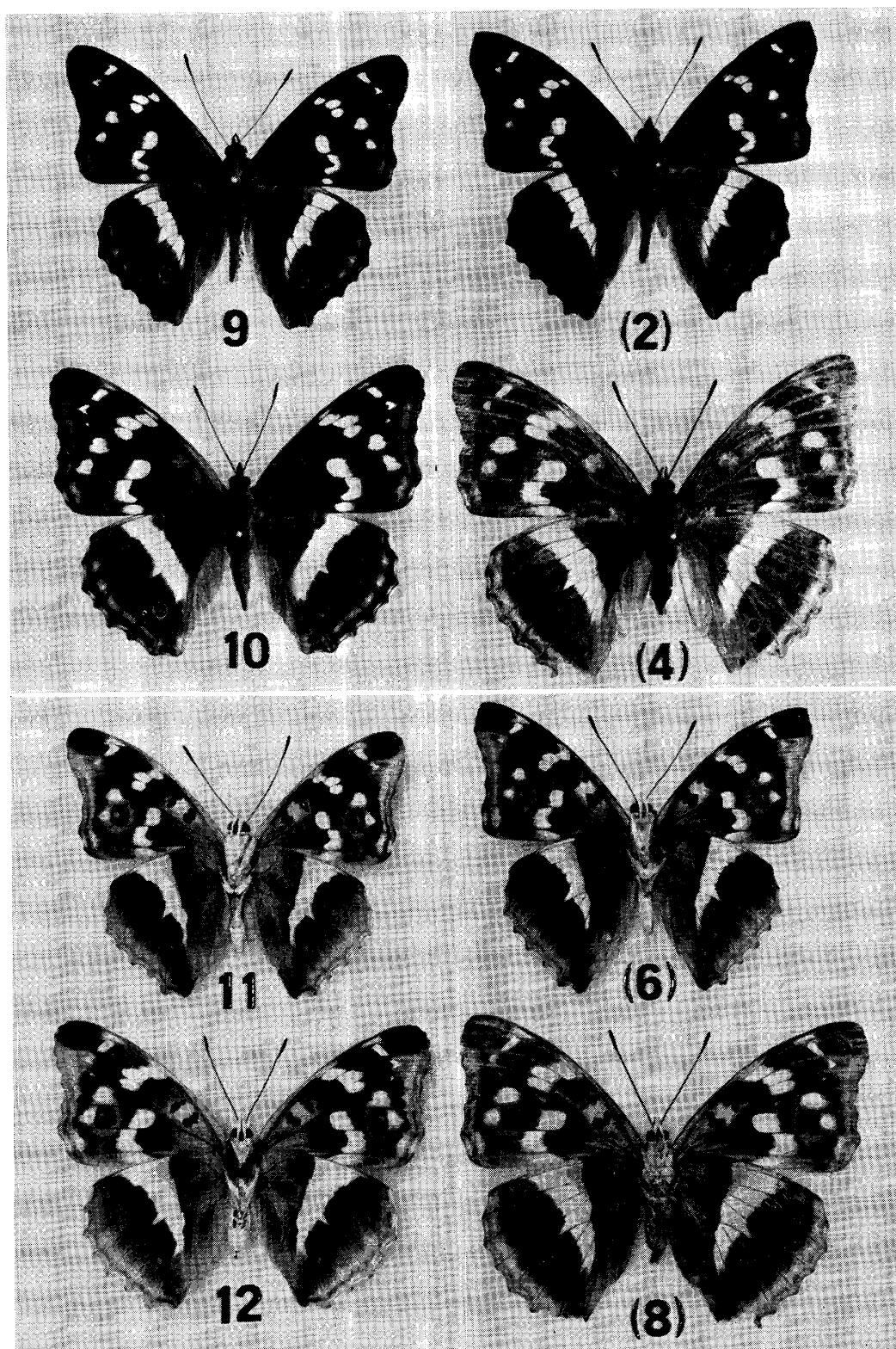
Incidentally, MORI *et al.* (1934) in their illustrated book not only concurred with SUGITANI's view on 'subspecies *iris*' in Korea, but went so far as to profess that subsp. *bieti* occurred in North Korea. As far as has been investigated, there does not seem to exist any authentic record of *bieti* males from East Asia. The authors suspect that the superficial similarity between some *amurensis* and *bieti* females would have led to the hasty conclusion. They can be quite similar to each other, but the females do not reveal the unmistakable difference between the males—*bieti* being orange and brown on the upperside, whereas all other known subspecies of *iris* have dark brown uppersides and white markings in common.

Yet SUGITANI's remark on great similarity between males of *iris iris* from Europe and *iris amurensis* from North Korea requires close examination. There are preserved in the SUGITANI Collection 12 *iris* specimens of both sexes from Continental Europe. He admitted that *amurensis* males were on the whole larger than *iris iris*, and the white bands in the former tended to be proportionately narrow, but was dubious about the "stronger gloss" or "less dark" ground colour of the former.

One of the authors, TAKAKURA, has seen hundreds of male specimens of *iris* of different origins in the British Museum (Natural History) and other collections in Europe, and dozens of female examples as well. He is particularly familiar with British specimens of *iris*, which trend to be larger than the Continental counterparts. Comparison between British and Korean specimens may be of interest, because they represent the westernmost and easternmost colonies, respectively (Figs. 2, 4 & 9, 10).

FROHAWK (1934) says the male wing expanse averages 76 mm, and that of the female, 84 mm. These values are evidently twice the forewing lengths plus the thoracic breadths. According to his natural size illustrations the male forewing length is about 37 mm, and the female forewing length, approximately 40 mm.

SEOK (1942) published the result of measurement of as many as 142 Korean specimens, and it is here reproduced in Table 1. In all probability these included specimens from central and southern localities which should now belong to subsp. *peninsularis* LEE et TAKAKURA, but their total number is considered to be comparatively small in



Figs. 9-12. 9. *A. i. iris* ♂, 25.6.77, Whiteparish, Wilts. Wing expanse 66.5 mm, forewing length 37 mm. 10. *A. i. iris* ♀, 28.6.77, Whiteparish, Wilts. Wing expanse 75 mm, forewing length 42.5 mm. 11, 12: undersides of figs. 9, 10. *N. B.* *A. i. peninsularis* subsp. nov. presented in two different photographic effects.

Table 1. Forewing lengths of Korean specimens of *A. iris* (After SEOK, 1942)

mm	32	33	34	35	36	37	38	39	40	41	42	43	44	Total	Mean
♂	1	5	11	26	33	16	14	2	3	—	—	—	—	111	35.96
♀	—	—	—	—	1	3	—	3	5	4	8	5	2	31	40.87

view of the fact that, outside the northern localities, he only mentioned Mts. Gungang, Seolag, Odae and Jiri.

Now, the average forewing length of the holotype and 17 paratypes of *peninsularis* is 38.83 mm (holotype: 39 mm); the average of 9 examples collected on Mt. Seolag stands at 39 mm, and 21 males from a recently discovered locality in Gyeonggido average 38.14 mm in forewing length. The forewing length of the allotype is 46 mm, and that of another female mentioned earlier, 45 mm. It may be added that two 41-mm male specimens each are included in the paratypes and the Mt. Seolag series. These large insects are unrivalled in table 1.

It appears as if *iris* of any locality is subject to variation in size, markings and even in wing shape. Unless long enough series of preferably fresh specimens of both sexes are used for comparison, one may over- or underestimate individual features. In the absence of a sufficient number of tolerably good and fresh specimens from Korean localities, the authors did not attempt to evaluate such subtler features as wing shape, hue of the purple sheen, or relative thickness of the white band, etc. Therefore, the authors chose only five features in addition to the size as keys to distinction among the three subspecies: *iris*, *amurensis* and *peninsularis*, as shown in table 2.

Table 2 and figs. 1–12 are hoped to offer sufficient evidence that *amurensis* is a valid subspecies, and that *peninsularis* is distinct from either *iris* or *amurensis*.

Table 2. Comparison of distinctive features among the three subspecies of *A. iris*. UP=upperside, UN=underside, F=forewing, H=hindwing.

Features	<i>iris</i>	<i>amurensis</i>	<i>peninsularis</i>
Submarginal spot in sp. 2 (UPF)	white, well developed and clearly defined	white to yellowish, well developed but not clearly defined	white to orange, rather small and sometimes absent
Dark triangular postdiscal spots (UPH)	conspicuous, particularly in ♀	moderately conspicuous	not very distinct
Submarginal belt and dark outer margin (UP, especially H)	♂: belt light brown and thin; dark margin comparatively wide ♀: belt often broken into whitish spots varying in size; dark margin wide	♂: belt light brown and wide; dark margin also wide ♀: belt varying from rich orange brown to whitish, wide and well defined; dark margin wide	♂: belt light brown and thin; dark margin comparatively thin ♀: belt whitish, thin and well defined; dark margin very thin
Outer margin of brown discal zone (UNH)	usually without dark scales; occasionally with dark dots	usually dusted with dark scales	clearly demarcated with dark scales
Lilac marginal zone (UN, especially H)	wide	wide	narrow

Habits, etc

Iris in the Republic of Korea is anything but common, while it probably continues to be a locally abundant butterfly in its northern habitats, as far as the male butterfly is concerned. It is to be noted that *iris peninsularis* males have seldom been taken on wet ground or by the roadside. In at least three good localities known to the authors, males are to be met with at altitudes ranging from 800 to 1,200 metres or higher, on mountain tops and ridges where the Mongolian Oak, *Quercus mongolica*, predominates. It is well known that in Britain, *iris* males are strongly attracted to oaks. But this is not necessarily the case on the European Continent, in the Soviet Far East and possibly North Korea where the species are said to occur also in nondescript mixed forests.

In the southern localities of the Korean Peninsula, males probably fly some distances upward from their native places to settle down near or on the summits and ridges where Mongolian Oaks are abundant. The authors have never seen males feeding on sap or aphid secretion on oak leaves yet, but these are considered to be their source of nourishment. Neither have they caught males on animal droppings or carcasses, which are both strong attractants used elsewhere as baits.

A. iris peninsularis is single-brooded, emerging late in June to mid-July. At higher habitats males increase in number later in July. Both sexes appear to be quite long-lived, with worn individuals seen nearly until the end of August. The earliest record so far is 19th June 1978, when a fresh male specimen was captured on Mt. Seolag by LEE.

When this butterfly is on the wing, mountains in Korea are often under the influence of a rainy weather, with the result that wild specimens which are overwhelmingly males are very quickly damaged from getting wet. Not only are its cilia stripped off, its purple sheen also deteriorates after a male has experienced two or three downpours. Worn males may present but a faint, steel-blue sheen which is unknown in European specimens.

Both LEE and TAKAKURA confirmed, in separate localities, that one of the larval foodplants of *iris peninsularis* is a broad-leaved willow, similar to *Salix caprea* of Europe and *Salix bakko* of Japan. The authors feel that a kind of aspen may also be utilized.

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摘 要

1920 年前後から主として韓半島北部において採集されたチョウセンコムラサキ (*Apatura iris*) は亜種 *amurensis* STICHEL に属するとされたが、1930 年代以降、翅表に白斑・白帯を有する雌 (*amurensis* にあつては黄褐乃至黄色の斑紋) が北部、次いで中・南部で採集されたことにより、故石宙明 (D. M. SEOK) 氏は黄色系斑紋の雌を f. *amurensis*, 白色斑紋の雌を f. *iris* とし、亜種 *amurensis* の有効性を事実上否定した。然し、雄についての考究はなく、この説は必ずしも一般の承認を得るに至らなかった (LE MOULT 1950 等)。

筆者等は近年、半島中部の山岳地帯より多数の雄及び少数の雌を採集し、原亜種及び北部産の標本と比較を試みた。その結果、*amurensis* は、雌翅表の明色斑紋の色相が変化に富むが一往亜種名として有効であるとの結論に達した。而して、中・南部地方産のものは雌雄ともに大型、かつ翅の外縁部、特に後翅において *amurensis* 及び原亜種との間に差が認められるため、それらを新亜種 (*Apatura iris peninsularis* LEE et TAKAKURA) として記載した。